BLE4.2

Transparent Transmission Module Data Sheets

**UA287Q-BLE**

V1.2

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# Version History, Disclaimer and Notice

## 1.1 Version History

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Author | Description |
| V1.0 | 2018/2/6 | Water Chen | First draft |
| V1.1 | 2018/2/16 | Water Chen | updated |
| V1.2 | 2018/2/26 | Water Chen | updated |

## 1.2 Disclaimer and Notice

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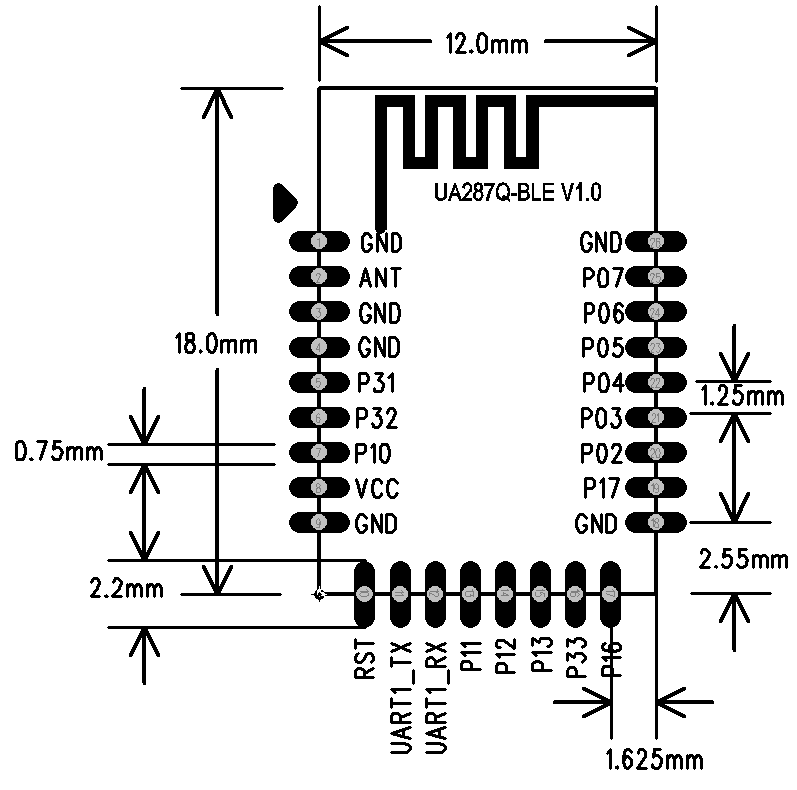
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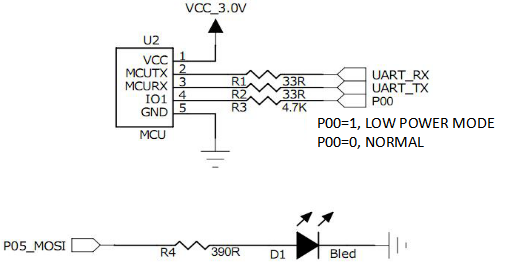
# General Description

Module UA287Q is based on high-performance SOC which highly integrated with Bluetooth 4.2 low energy single mode processor. It integrates a high-performance 2.4GHz RF transceiver, rich features baseband, ARM968E-S MCU and various peripheral IOs. It has embeded 4Mbit FLASH and 64KByte RAM to enable programmable protocol and profile to support customized applications.

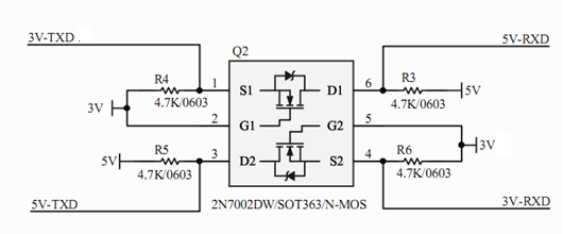
# Package and Dimensions



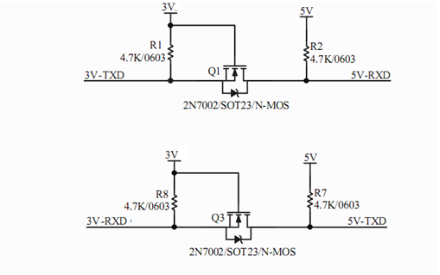
# Schematic and 5V-3V Level Shift Reference Design

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**Schematic**



**5V-3V Level Shift Circuit 1**



**5V-3V Level Shift Circuit 2**

# Product Function and Test Description

BLE slave mode support.

●Default setting:

Operation Mode: transparent transmission mode default. For using the AT command please switch to the command mode;

UART parameter: 9600, 8 bit data, no parity bit , 1 bit for stop;

BLE name: BleSerialPort;

Broadcast interval: “80, 80”, max=50ms, min=50ms;

Connect interval: “36,24,2,100”, max=36, min=24, latency=2, timeout=300(max=45ms,min=30ms,latency=2,timeout=1000ms).

●UART ports could be enabled to switch operation status and sleeping status.

●AT command mode and transparent transmission mode could be swithed by using command.

●AT command for parameter configuration is available.

●At 0dBm Tx power, connecting distance reaches 40m in open area.

●Each frame can packet up to 20 bytes data.

●Sleeping current: refer to chapter 10

●Supply voltage: 1.55~3.5V, 3.0 V is recommended

●Dimension: 18mm\*12mm\*1.7mm

●Applications:

BLE health products, Wearable devices, Smart home, BLE toys, Lighting control, Bluetooth to serial products.

# UUID

Slave service UUID: 0xFFB0

Eigenvalue UUID: 0xFFB1 Properties: Write Notify

Eigenvalue UUID: 0xFFB2 Properties: Write Notify

# Communication Interface for Module and MCU

## 7.1 Asynchronous Serial Communication

BLE module communicate with MCU by serial port (UART).

Default port parameter: baud rate 9600, 8 data, 1 stop, no parity.

## 7.2 Packet Format

Transparent transmission mode: BLE module forwards the data from MCU to APP without change. And the same as data from APP to MCU.

Instruction mode: Module can be configured by AT command by either APP or PC UART.

## 7.3 Operation Mode Setting

Switching between AT command mode and transparent transmission mode:

Power on default transparent transmission mode. Send“+++” then return“AT+ok Mode=AT Mode\r\n”, the module turns into AT command mode and AT command are available for setting and reading.

Send“AT+exit\r\n”then return“AT+ok Mode=Normal\r\n”, the module turns back to transparent transmission mode and data will be transparently transmitted directly.

**Notie:** **Don’t insert any other characters inside “+++”.**

# Pin Assignment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | GND | PWR GND | 14 | P12 | General IO/ PWM2 |
| 2 | ANT | Antenna port | 15 | P13 | General IO/ PWM3 |
| 3 | GND | GND | 16 | P33 | General IO/ ADC3 |
| 4 | GND | GND | 17 | P16 | General IO/ UART2\_TX |
| 5 | P31 | General IO/ ADC1 | 18 | GND | GND |
| 6 | P32 | General IO/ ADC2 | 19 | P17 | General IO/ UART2\_RX |
| 7 | P10 | General IO/ PWM0 | 20 | P02 | General IO/ I2C\_SCL |
| 8 | VCC | POWER | 21 | P03 | General IO/ I2C\_SDA |
| 9 | GND | GND | 22 | P04 | General IO/ SPI\_SCK |
| 10 | RSTN | Analog(Active low pin reset) | 23 | P05 | General IO/ SPI\_MOSI |
| 11 | P00 | GND/ UART1\_TX | 24 | P06 | General IO/ SPI\_MISO |
| 12 | P01 | General IO/UART1\_RX | 25 | P07 | General IO/ SPI\_NSS |
| 13 | P11 | General IO/ PWM1 | 26 | GND | GND |

UART switch: 24PIN(P06). UART enabled at low level and module stays in normal mode. UART closed at low level and module enters low power mode.

Status lamp: 14PIN(P12). Low level while disconnected and get high while connected. Or high level when receiving data from APP and low level that after.

On&off：14PIN(P13), low for DEEPSLEEP mode, high for normal mode,hanging for work mode.

# AT Command

Notice: Power on default transparent transmission mode, and send“+++” into command mode. AT command finishes with “\r\n” in command mode. Tick ”send new line” in serial port assistant.

## 9.1 AT Command List

|  |  |
| --- | --- |
| Command | Description |
| “AT+setBR 9600\r\n” | Set baud rate |
| “AT+getName\r\n” | Read BLE name |
| “AT+setName=bleName\r\n” | Set BLE name |
| “AT+getAddr\r\n” | Get BLE address |
| “AT+setAddr=112233445566\r\n” | Set BLE address |
| “AT+getStatus\r\n” | Get BLE status |
| “AT+setAdvInt 80 100\r\n” | Set broadcast interval |
| “AT+setConnInt 36 24 2 300 \r\n ” | Set connection interval |
| “AT+disConnect\r\n” | Disconnect |
| “AT+reStart\r\n” | Restart |
| “AT+getPara\r\n” | Get config parameter |
| “AT+exit\r\n” | Exit command mode(truns to transparent transmission mode);  Send “+++”swichs to command mode to transparent transmission mode. |
| “AT+shutDown\r\n” | Shut down |
| “AT+reStore\r\n” | Factory reset |
| “AT+getInfo\r\n” | Version inquiry |
| “AT+help\r\n” | Instruction help |

## 9.2 Set Baud Rate

Notice: Not valid until manual restart.

Example: “AT+setBR 9600\r\n” (“\r\n”is end mark, hexadecimal as “0D 0A” , the same below)

Hex: 41 54 2B 20 73 65 74 42 52 20 39 36 30 30 0D 0A (There is no space between each number. The space can be inserted by some software and some can ignore spaces automatically, the same below)

Replies: “AT+ok\r\n” (Operation completed); “AT+err\_code\r\n” (Operation failed, refer to“Returned error code indication”for detailed err\_code)

|  |
| --- |
| Baud rate range: (Error indicated for incorrect baud rate ) |
| 2400, 4800, 9600, 19200, 38400, 57600, 115200 |

## 9.3 Read BLE Name

Example: “AT+getName\r\n”

Hex: 41 54 2B 20 67 65 74 4E 61 6D 65 0D 0A

## Replies: “AT+ok\r\n” (Operation completed); “AT+err\_code\r\n” (Operation failed, refers to“Returned error code indication”for detailed err\_code)

## 9.4 Set BLE Device Name

Notice: Not availble until manual restart.

Example: “AT+setName=bleName\r\n”(such as SENSSUN FAT)

Hex: 41 54 2B 20 73 65 74 4E 61 6D 65 20 3D 62 6C 65 4E 61 6D 65 0D 0A

Replies: “AT+ok restart effect!\r\n” (Operation completed, valid after sending command and restart); “AT+err\_code\r\n” (Operation failed, refer to“Returned error code indication”for detailed err\_code)

## 9.5 Read BLE MAC Address

Example: “AT+getAddr\r\n”

Hex: 41 54 2B 20 67 65 74 41 64 64 72 0D 0A

Replies: “AT+ok FF:11:22:33:66:FF\r\n” (Operation completed); “AT+err\_code\r\n” (Operation failed, refer to“Returned error code indication”for detailed err\_code)

## 9.6 Set BLE MAC Address

Example: “AT+setAddr=112233445566\r\n”

Hex: 41 54 2B 20 73 65 74 41 64 64 72 3D 31 31 32 32 33 33 34 34 35 35 36 36 0D 0A

Replies: “AT+ok restart effect!\r\n” (Operation completed, valid after sending command and restart); “AT+err\_code\r\n” (Operation failed, refer to“Returned error code indication”for detailed err\_code)

## 9.7 Read BLE Status: Broadcast/Connected

Example: “AT+getStatus\r\n”

Hex: 41 54 2B 20 67 65 74 53 74 61 74 75 73 0D 0A

Replies: “AT+ok status\_code\r\n”(Operation completed), status\_code as below:

|  |  |
| --- | --- |
| 00 | Idle |
| 01 | Broadcasting |
| 02 | Connecting |
| 03 | Scan with response |
| 04 | scan without response |

“AT+err\_code\r\n” (Operation failed, refer to“Returned error code indication”for detailed err\_code)

## 9.8 Set Broadcast Interval

Not valid until manual restart.

Example: “AT+setAdvInt 80 100\r\n” (min interval 80\*0.625ms, max interval 100\*0.625ms)

Hex: 41 54 2B 20 73 65 74 41 64 76 49 6E 74 20 38 30 20 31 30 30 0D 0A

(Maximum and minimum of broadcast interval,“min<=max”, 80~16000 correspond to 50ms~10000ms)

Replies: “AT+ok restart effect!\r\n” (Operation completed, valid after sending command and restart); “AT+err\_code\r\n” (Operation failed, refer to“Returned error code indication”for detailed err\_code)

## 9.9 Set Connection Interval

Notice: valid immediately, constantly setting will get dropped.

Example: “AT+setConnInt 36 24 2 300 \r\n ”(The value respectively max, min, latency, timeout)

Hex: 41 54 2B 20 73 65 74 43 6F 6E 6E 49 6E 74 20 33 36 20 32 34 20 32 20 33 30 30 0D 0A

In the example above, max interval 36\*1.25ms, min interval 24\*1.25ms, latency 2, connecting timeout 300\*10ms.

Min and max broadcast interval range: 0x0006~0x0C80(7.5ms~4000ms), min<=max.

Latency: value range: 0x0000~0x01F3(0~499).

Connecting time out: value range: 0x000A~0x0C80. Connection interval must less than connecting timeout: [max\*1.25 \* (1+latency)] < 10 \* timeout.

Replies: “AT+ok\r\n” (Operation completed, valid immediately without restart); “AT+err\_code\r\n” (Operation failed, refer to“Returned error code indication”for detailed err\_code)

## 9.10 Disconnect BLE

Example: “AT+disConnect\r\n”

Hex: 41 54 2B 20 64 69 73 43 6F 6E 6E 65 63 74 0D 0A

Replies: “AT+ok\r\n” (Operation completed); “AT+err\_code\r\n” (Operation failed, refer to“Returned error code indication”for detailed err\_code)

## 9.11 Reset/Restart

Example: “AT+reStart\r\n”

Hex: 41 54 2B 20 72 65 53 74 61 72 74 0D 0A

Reply: “AT+ok restart now \r\n” (Operation completed, restart at once automatically)

## 9.12 Read Parameter

Example: “AT+getPara\r\n”

Hex: 41 54 2B 20 67 65 74 50 61 72 61 0D 0A

Reply: “AT+ok uart 9600,8,N,1; adv 120 160; con 36,24,2,300.\r\n” (Operation completed), returned parameter contains UART port, broadcast interval, connection interval.

## 9.13 Exit Command Mode

Example: “AT+exit\r\n”

Hex: 41 54 2B 20 65 78 69 74 0D 0A

Reply: “AT+ok Mode=Normal\r\n” (Operation completed, switches to transparent transmission mode)

## 9.14 Shut Down

Example: “AT+shutDown\r\n”

Hex: 41 54 2B 20 73 68 75 74 44 6F 77 6E 0D 0A

Reply: “AT+ok power off now!\r\n”(Operation completed)

## 9.15 Factory reset

Example:“AT+reStore\r\n”

Hex: 41 54 2B 20 72 65 53 74 6F 72 65 0D 0A

Reply:“AT+ ok restart now\r\n”(Operation completed)

## 9.16 Version inquiry

Example:“AT+getInfo\r\n”

Hex: 41 54 2B 67 65 74 49 6E 66 6F 0D 0A

Reply:AT+ok HW=UA287Q-BLE-JXKJ,SW=V0.2

## 9.17 Instruction help

Example: “AT+help\r\n”

Hex:41 54 2B 20 68 65 6C 70 0D 0A

Reply:AT+ok Help:

system\_shutdown

setBR

getName

setName

getAddr

setAddr

getStatus

setAdvInt

setConnInt

disConnect

reStore

reStart

getPara

getInfo

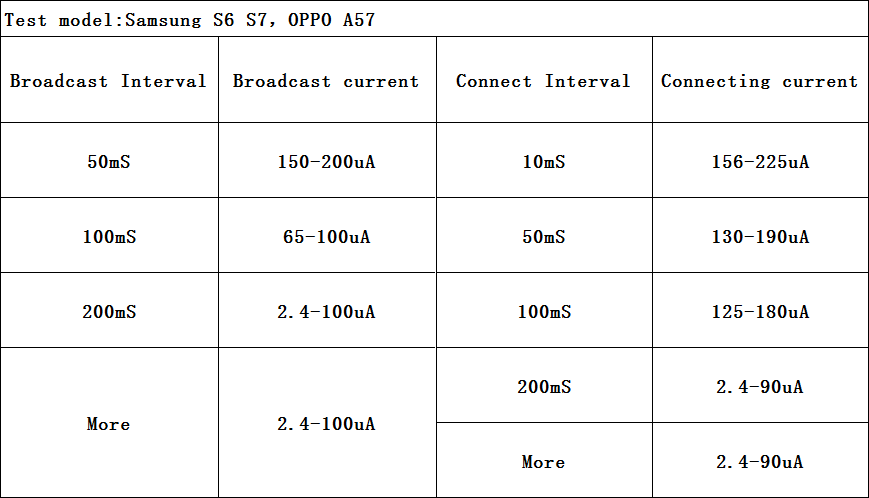
exit

help

## 9.18 Returned Error Code Indication

|  |  |
| --- | --- |
| err\_code | Indication |
| “06” | The last operation was not completed |
| “07” | Command parameter is not valid |
| “08” | Disconnected |
| “09” | Connecting |
| “10” | Broadcasting |
| “11” | Operation failed |

# Power consumption



# Appendix: Reference Specification

《BLUETOOTH SPECIFICATION Version 4.2》

《IEEE 802.15.1》